

**A Prospective Investigation of the Role of Mindfulness and Self-Compassion in
Weight Loss and Weight Loss Maintenance in Adults with Obesity**

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Except where due reference is made in the text, this thesis is my own original work. It has not been submitted for any other degree, or diploma at any university.

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Title: A Prospective Investigation of the Role of Mindfulness and Self-Compassion in Weight Loss and Weight Loss Maintenance in Adults with Obesity

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Abstract

Understanding the psychological factors implicated in weight loss and weight loss maintenance is integral to the development of effective weight loss treatment approaches. Emerging evidence suggests that the psychological constructs of mindfulness and self-compassion may play a role in weight loss outcomes, though limitations of previous research prevent definitive conclusions. As such, the current study aimed to investigate the association between both mindfulness and self-compassion, and weight loss. The participants were 201 adults with obesity who participated in a cognitive behavioural weight loss program and were assessed on their levels of, and changes in, mindfulness and self-compassion across the treatment and follow-up phases. Results revealed that neither baseline levels nor changes in self-compassion (measured using the Self-Compassion Scale Short Form) significantly predicted weight loss. There was some, albeit limited, evidence that mindfulness predicted weight change using the Kentucky Inventory of Mindfulness Skills, which measures four components of mindfulness (Acting with Awareness, Accepting without Judgement, Observing, and Describing). Specifically, higher baseline levels of Accepting without Judgement was a significant predictor of weight loss at post-treatment, yet increases on the same scale across the course of treatment predicted weight gain at post-treatment. Moreover, higher levels of Acting with Awareness at post-treatment approached significance in predicting weight loss at follow-up. Overall, the findings provide somewhat limited support for the role of mindfulness in weight loss and weight loss maintenance, and no support for self-compassion. The results have potential implications for the assessment of these constructs in the obesity context and their role in obesity interventions.

Keywords: mindfulness; self-compassion; weight loss; obesity treatment

Introduction

It is well established that the obesity epidemic has reached unprecedented levels and is a significant challenge for health care systems around the world. In 2014, the number of individuals who were overweight or obese was approaching two billion worldwide, a figure that has doubled since 1980 (World Health Organization, 2015). In Australia, two in three adults and one in four children are overweight or obese (Australian Institute of Health and Welfare, 2016). Such high prevalence rates are of pressing concern considering obesity raises an individual's risk of various health problems, including cardiovascular diseases (Kenchiah et al., 2002), hypertension (Nguyen, Magno, Lane, Hinojosa, & Lane, 2008), and type II diabetes (Colditz, Willet, Rotnitsky, & Manson, 1995). In light of the prevalence and deleterious effects of obesity, research has endeavoured to identify factors implicated in weight loss among individuals with obesity in the hope of providing a platform upon which behavioural weight loss programs can be designed.

To date, a diverse range of psychological factors have been investigated in terms of predicting weight loss and adherence to weight control behaviours (i.e., dieting and physical activity), including self-motivation (Teixeira et al., 2004a), self-efficacy (Linde, Rothman, Baldwin, & Jeffery, 2006), locus of control (Nir & Neumann, 1995), depression (Blaine, 2008), and disordered eating (Cuntz, Leibbrand, Ehrig, Shaw, & Fichter, 2001), with each demonstrating some but inconsistent predictive value in weight loss. However, behavioural weight loss programs continue to yield inadequate weight outcomes, particularly in terms of poor maintenance of weight loss after treatment cessation. Typically, individuals with obesity regain about half of their lost weight within the first year following weight loss, and approximately 80% return to or exceed their initial weight within a three to five year period after

weight loss (Byrne, Cooper, & Fairburn, 2003). Such outcomes call for greater attention to other potential factors that may foster weight loss and weight loss maintenance. In the present study, the role of two additional psychological constructs in weight loss and weight loss maintenance will be investigated, namely, mindfulness and self-compassion.

Mindfulness originated from the Buddhist concept of mindfulness meditation, and is commonly operationalised as awareness of the present moment through observing and describing one's own experiences without reaction or judgement (Olson & Emery, 2015). It involves remaining aware of both external stimuli, such as one's immediate environment, and internal stimuli, such as thoughts, emotions, and sensations (Brown & Ryan, 2003). While some individuals have naturally greater mindfulness abilities than others, most individuals are capable of practicing mindfulness and acquiring this skill (Brown & Ryan, 2003).

Mindfulness has been incorporated into various psychological interventions (e.g., mindfulness-based stress reduction [Kabat-Zinn, 1990] and mindfulness-based cognitive therapy [Segal, Williams, & Teasdale, 2013]), with a body of literature supporting its role in enhancing psychological well-being. For instance, mindfulness interventions have shown to reduce levels of distress and rumination (Jain et al., 2007) as well as depression and anxiety (Anderson, Lau, Segal, & Bishop, 2007). Arch and Crask (2006) found that even a simple mindfulness breathing induction resulted in less negative affect reactivity following exposure to aversive stimuli. Mindfulness is of particular interest in weight loss interventions as it can enhance self-regulation by improving awareness of the sensory and emotional cues that habitually trigger unhealthy weight control behaviours, as well as the ability to tolerate negative states (e.g., overeating triggered by aversive emotional states;

O'Reilly, Cook, Spruijt-Metz, & Black, 2014). In addition to negative emotions, mindfulness may help individuals better tolerate aversive physical sensations associated with dieting (e.g., hunger pains) and physical activity (e.g., muscle soreness and pain; Forman et al., 2007). In support of this, Forman and colleagues (2007) found that individuals in a mindfulness condition were better able to manage food cravings and refrain from eating a box of chocolates for 48 hours compared to those in a control or cognitive change condition.

Such findings indicate that mindfulness abilities may help individuals engage in cognitive behavioural strategies for weight loss, where they would be required to tolerate aversive physical and emotional states in order to engage in weight loss consistent behaviours. For instance, cognitive behavioural weight loss programs teach 'urge surfing', a skill used to tolerate urges or cravings until they have diminished (Beck, 2012). By observing internal experiences, individuals have the ability to notice their urges, and instead of reactively or mindlessly eating in response to the urge, they can learn to tolerate the impermanent internal experience, and mindfully shift their attention to another activity if required. Moreover, cognitive behavioural approaches attempt to increase emotional awareness in order to identify and manage emotional triggers for behaviours inconsistent with weight loss. Emotional awareness can be increased by mindfully observing affective states, and through describing or labelling emotions the individual is better able to regulate their emotions (Gyurak, Gross, & Etkin, 2011). Additionally, awareness of emotions provides individuals with the ability to employ adaptive coping strategies to cope with their emotions, such as engagement in a pleasant activity or relaxation. Mindfulness should therefore theoretically facilitate engagement in cognitive behavioural strategies that enhance weight loss.

There has, in fact, been a surge of interest regarding the use of mindfulness in the treatment of individuals with overweight or obesity, with some making strong claims regarding its role in this context. For instance, Godsey (2013) proposes that, “mindfulness is relevant to cognition and learning and is an essential component of holistic obesity treatment” (p. 434). However, meta-analytic findings suggest mindfulness based interventions have only a small effect size in terms of pre-treatment to post-treatment changes in body mass index (Rogers, 2016). Nevertheless, it would be premature to discuss the role of mindfulness in weight loss given that methodological issues and inconsistencies in the literature limit possible conclusions to be drawn about its efficacy. For example, several randomised control trials employing mindfulness interventions found significant changes in mindfulness and weight loss across treatment, but did not directly evaluate the relationship between these two changes to determine whether higher levels of mindfulness were associated with greater weight loss (Mantzios & Giannou, 2014; Mantzios & Wilson, 2014; Miller, Kristeller, Headings, & Nagaraja, 2014). Indeed, studies finding significant improvements in mindfulness, but not weight loss, following a mindfulness intervention raise questions about whether mindfulness truly predicts weight loss (Daubenmier et al., 2011). Other studies that have found significant weight loss did not include a measure of mindfulness (despite administering a mindfulness intervention), meaning that the role of mindfulness in these weight changes cannot be determined (Forman et al., 2013; Lillis, Hayes, Bunting, & Masuda, 2009). Considering that many interventions include multiple therapeutic components alongside mindfulness (e.g., education, self-monitoring, and dietary planning), the lack of a mindfulness measure, or not evaluating the association between mindfulness

and weight loss, makes it difficult to ascertain whether mindfulness, as an independent component of the intervention, impacted weight loss outcomes.

The direct relationship between changes in mindfulness and changes in weight has only been measured in one study to date. In this study conducted by Forman, Butryn, Hoffman, and Herbert (2009), 29 women who were overweight or obese participated in a 12-week acceptance-based weight loss trial, which included mindful awareness of eating behaviours. No relationship between changes in mindfulness and the percentage of weight lost from baseline to program completion was identified, despite significant weight loss and significant improvement in mindfulness skills across the treatment phase. With just 19 individuals assessed at post-intervention, it is possible that no relationship was detected due to limited statistical power. However, a significant relationship was found between changes in mindfulness (across the treatment phase) and weight loss at the six-month follow up, which may be the result of participants beginning to rely on their mindfulness skills as a coping strategy once treatment ceased. It is also possible that this was a chance finding considering the limited sample size of 12 at the follow-up assessment. Thus, while mindfulness has been increasingly endorsed as a factor in weight loss, the direct relationship between these two constructs remains unclear and requires further investigation.

Incorporating and extending upon the concept of mindfulness is self-compassion, the second psychological construct investigated in the present study. As with mindfulness, self-compassion is derived from Buddhist philosophy, and is defined as a healthy form of self-acceptance, or the ability to experience suffering with a sense of warmth and kindness (Neff, 2003a). Self-compassion encompasses three main dimensions: self-kindness, common humanity, and mindfulness (Neff, 2003a). Self-kindness refers to being caring and understanding towards oneself in

instances of suffering and is contrasted with self-judgement, which involves being harshly critical of oneself. Common humanity refers to an understanding that pain is a common aspect of the human experience, which fosters a sense of connectedness to others during times of difficulty. It is contrasted with isolation, which involves seeing oneself as alone in suffering. Mindfulness, as described above, refers to the ability to take a non-judgemental approach to thoughts and emotions, and is contrasted with over-identification, which involves being absorbed in one's own thoughts and feelings. These distinct constructs interact with one another, generating a "self-compassionate frame of mind" (Germer & Neff, 2013, p. 1).

While the self-compassion literature is in its infancy, research has found higher levels of self-compassion to be positively associated with lower levels of psychological stress, anxiety symptoms, and depressive symptoms (MacBeth & Gumley, 2012). Experimental studies have highlighted the adaptive nature of self-compassion, such that an induced self-compassionate perspective towards a personally humiliating or rejecting event can result in lower negative affect (Leary, Tate, Adams, Allen, & Hancock, 2007). This highlights that, like mindfulness, self-compassion is associated with greater psychological well-being.

Understanding the central role of negative thoughts and feelings in weight loss interfering behaviours (e.g., binge eating and emotional eating) provides a framework in which the value of self-compassion in weight loss can be understood. For people who diet, a failure or break in a diet can trigger negative affect and self-criticism, and such negative thoughts and feelings can then trigger overeating (Heatherton, 1993). While overeating in response to a lapse in a diet may seem paradoxical, Heatherton and Baumeister's (1991) escape theory proposes that this response is due to the unpleasantness of remaining self-aware following the initial diet break. When

remaining self-aware is uncomfortable, individuals tend to focus on more concrete aspects of their environment in order to cope. So, these individuals lower their levels of self-awareness by focusing on food (e.g., smell, texture, and taste), which results in a reduction of negative affect during the eating episode. While this may help alleviate the distress associated with self-awareness in the immediate instance, it prevents individuals from maintaining a focus on their broader weight loss goals (Adams & Leary, 2007). Moreover, escape theory proposes that emotional distress can return upon completion of the eating episode, thereby leaving the individual vulnerable to further dieting failures. Considering self-compassion has been associated with attenuated negative affect in response to distressing personal events (Leary et al., 2007), it is possible that adopting a self-compassionate perspective could be of benefit in dealing with dieting failures, and indeed, other triggers of emotional distress. Indeed, Adams and Leary (2007) found an induced self-compassionate perspective following consumption of a donut reduced over-eating and distress among highly restrictive eaters.

Given this, a self-compassionate perspective may be beneficial for individuals engaged in a cognitive behavioural weight loss program, where individuals are required to modify longstanding maladaptive eating patterns. Specifically, the ability to practice kindness towards the self in instances of dieting failures (e.g., eating outside planned meal times or overeating) may help to reduce the occurrence of further behaviours that are inconsistent with weight loss (e.g., shame-induced overeating). As well as assisting with mood regulation, self-compassion might assist with the maintenance of self-efficacy for engaging in the skills taught in a cognitive behavioural weight loss program. For instance, whilst self-judgement after dietary lapses may undermine the individual's sense of self-efficacy that is necessary for

engaging in weight loss behaviours (Linde et al., 2006), self-kindness may maintain or enhance the individual's self-efficacy thereby allowing them to re-engage in effective weight loss behaviours.

While self-compassion has as yet received little attention in the context of weight loss, one study found that a combined mindfulness and self-compassion intervention predicted greater weight loss at program completion and the six-month follow-up compared to a mindfulness only intervention (Mantzios & Wilson, 2015). While preliminary in nature, this research, and the emerging body of evidence highlighting the benefits of self-compassion in psychological well-being, calls for further investigation of the role of self-compassion in weight loss and weight loss maintenance among individuals with obesity.

As such, the present study will investigate whether mindfulness and self-compassion are implicated in weight loss and weight loss maintenance among adults with obesity participating in a weight loss program. Following the aforementioned study by Forman and colleagues (2009), this will be the second study to measure and directly compare changes in mindfulness and weight loss following a weight loss treatment program. The present study will overcome the limitations of previous research by utilising a large sample size, by measuring baseline levels of mindfulness in relation to changes in weight loss, and by accounting for the potential effects of other variables on weight loss. It will also expand on the current literature by examining the role of self-compassion in weight changes in those with obesity.

Since theoretical and empirical work suggests that mindfulness and self-compassion are implicated in eating and weight problems, it is hypothesised that individuals with obesity will have lower levels of mindfulness and self-compassion compared to the normative samples used in the development of measures of

mindfulness and self-compassion. We also hypothesise that higher levels of mindfulness and self-compassion at the beginning of a behavioural weight loss program will significantly predict greater weight loss at the end of the program, and that higher levels of mindfulness and self-compassion at the end of the program will predict greater weight loss maintenance at the follow-up assessment. Finally, we hypothesise that improvements in mindfulness and self-compassion across the treatment phase will significantly predict greater weight loss at program completion and greater weight loss maintenance at the follow-up assessment, and improvements in mindfulness and self-compassion across the maintenance phase will significantly predict greater weight loss maintenance at follow-up assessment.

Method

Design

Full details of the study are contained in Rieger and colleagues (2013). In brief, the study entailed a two-arm, randomised controlled trial investigating the effectiveness of 26 sessions of a group cognitive behavioural (CBT) weight loss program with (CBT-Support Person) and without (CBT-Alone) the addition of significant others trained to provide weight management support for people with obesity.

Participants

Participants were eligible to take part in this study entailing a cognitive behavioural weight loss program if they were aged 18 years or older, and had a body mass index (BMI kg/m^2) of 30 or greater. Potential participants who were pregnant, currently undergoing treatment for obesity, engaged in any treatments that may impact weight or eating, or suffering from a major psychiatric or medical condition were excluded from the study.

Participants were recruited through strategies such as newspaper advertisements, from patients with obesity attending local general practices and tertiary obesity services, and from a clinical trials database of the Boden Institute (University of Sydney). Approval to conduct the study was obtained from the Human Research Ethics Committees of the Australian National University, the University of Sydney, and the Royal Prince Alfred Hospital, Sydney. All participants provided written informed consent.

The sample size at pre-treatment was 201 participants. Of the total sample (combining the CBT-Support Person and CBT-Alone conditions), 73.6% ($n = 148$) were female, and participants ranged between 19 and 68 years of age ($M = 47.03$, $SD = 11.51$). Around half of participants (55.7%) were married, and more than half of participants (63.7%) had obtained a bachelor-level qualification or higher. Participants had a mean weight of 105.60kgs ($SD = 20.66$) and a mean BMI of 37.30 ($SD = 6.11$). There were no significant differences between the CBT-Support Person and CBT-Alone conditions on any of these variables.

Cognitive behavioural Weight Loss Program

Participants in both the CBT-Alone and CBT-Support Person conditions took part in the same one-year cognitive behavioural weight loss program (a full description of the intervention can be found in Rieger et al., 2013). The initial stage of treatment (approximately the first eight months) focused on weight loss skills and included education (e.g., the recommended caloric intake and the structure of eating), as well as introducing self-monitoring of eating and physical activity. Various cognitive behavioural skills were utilised to help manage cravings and emotional triggers associated with over-eating, including pleasant activity scheduling, distraction, and relaxation. Other skills included assertiveness training, problem

solving, and thought challenging. The second stage of the intervention (approximately four months) concentrated on skills specific to weight loss maintenance, such as developing a weight maintenance plan and using weight-tracking strategies (e.g., self-review sessions).

While mindfulness and self-compassion were not explicitly targeted in the treatment, strategies such as self-monitoring required attention to eating behaviours, as well as awareness of the various triggers (e.g., distressing emotions) that may be compromising eating goals. Moreover, both the use of thought challenging and the support of the therapist and other group members may have helped to encourage the adoption of a self-compassionate perspective when faced with weight-related challenges.

Measures

Each of the following measures was administered at the beginning of treatment (baseline), the end of the 12-month treatment program (post-treatment), and a follow-up one year after treatment cessation. Copies of each of the self-report measures are contained in Appendix B.

Participants' weight (kg) was measured using an electronic scale with a 200kg capacity. Participants were weighed in light clothing, and their weight was recorded to the closest kilogram. Height (cm) was recorded using a stadiometer.

The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) was administered to measure levels of mindfulness. The KIMS is a 39-item self-report questionnaire that assesses four components of mindfulness: Observing (i.e., the ability to notice cognitions, emotions, and physical sensations), Describing (i.e., the ability to label observed phenomena), Acting with Awareness (i.e., the ability to focus solely on the present moment) and Accepting without Judgement (i.e., the

ability to be non-judgemental about one's present-moment experiences). The KIMS is measured on a five point Likert scale, with higher scores indicating greater levels of mindfulness. The four-factor structure in the KIMS has been empirically validated (Baer et al., 2004; Baum et al., 2010), and the subscales are sensitive to clinical change (Baum et al., 2010). The KIMS has sound test-retest reliability (Observe = .65, Describe = .81, Acting with Awareness = .86, and Accepting without Judgement = .83; Baer et al., 2004), with the test-retest period spanning across a two-week period. Internal consistency (Cronbach's alpha) in the present study was 0.82.

Self-compassion was measured using the 12-item Self-Compassion Scale Short-Form (SCS-SF; Raes, Pommier, Neff, & Van Gucht, 2011), which measures the three main dimensions of self-compassion: self-kindness versus self-judgement, common humanity versus isolation, and mindfulness versus over-identification. The SCS-SF has a near perfect correlation ($r = 0.97$) with the original self-compassion scale (Raes et al., 2011), which is the most widely used measure of self-compassion. The SCS-SF was also utilised as it has good test-retest reliability (.71), measured over a period of five months (Raes, 2011). While test-retest reliability of the individual scales on the SCS-SF has not been assessed, there is good test-retest reliability of these factors on the SCS (Kindness = .88, Self-Judgement = .88, Common Humanity = .80, Isolation = .85, Mindfulness = .85, and Over-Identification = .88; Neff, 2003b). Cronbach's alpha in the present study was 0.82.

The Weight Efficacy Lifestyle Questionnaire (WELQ; Rossi, Rossi, Velicer, & Prochaska, 1995) was employed to measure participants' confidence in their ability to control their eating in situations that increase vulnerability to overeating. Confidence is measured on a 10-point Likert scale, with higher scores indicating higher levels of self-efficacy. Internal consistency in the present study was 0.90.

The Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was administered to assess the severity and frequency of depression (Cronbach's $\alpha = 0.88$), anxiety (Cronbach's $\alpha = 0.76$), and stress (Cronbach's $\alpha = 0.87$) symptoms. The three scales are comprised of seven questions, answered on a four-point scale from 0 (*did not apply to me over the last week*) to 3 (*applied to me very much or most of the time over the past week*). Higher scores on each scale indicate higher symptomatology of the corresponding construct.

In the present study, the individual facets of mindfulness (KIMS) and self-compassion (SCS-SF) were examined, as opposed to the overall scores. This allowed for assessment of particular components of these constructs to be examined in relation to weight loss among individuals with obesity. Moreover, the WELQ and DASS were included as covariates in the present study, as self-efficacy and depression have been found to predict changes in weight (Linde et al., 2006; Somerset, Graham, & Markwell, 2011). These variables were controlled for in the analyses in attempt to examine the unique effects of mindfulness and self-compassion on weight loss.

Statistical Analysis

Statistical analyses were performed using SPSS version 23. Prior to analysis, all data were inspected for outliers and distribution was assessed. Before conducting the main analyses, paired *t*-tests were performed to determine whether there were significant changes in KIMS and SCS-SF subscale scores from pre-treatment to post-treatment, and post-treatment to follow-up. For the first hypothesis, independent samples *t*-tests were used to test between group differences (i.e., obesity group and comparison groups) on KIMS and SCS-SF scores at baseline. For the remaining hypotheses, linear regression models were performed with list wise deletion. To address the issue of attrition across the trial stages, one-way ANOVAs were

conducted to determine whether there were significant differences between completers and non-completers on baseline levels of mindfulness and self-compassion. Results revealed no significant differences on baseline levels of mindfulness between completers and those who did not complete the post-treatment ($F(1,196) = 1.621, p = .204$) and follow-up ($F(1,196) = 1.792, p = .182$) assessments. There was also no significant difference on baseline levels of self-compassion between completers and those who did not complete the post-treatment assessment ($F(1,198) = .891, p = .346$). However, there was a significant difference between completers and those who did not complete the follow-up assessment ($F(1,198) = 4.141, p = .043$). Given this, data imputation was conducted using multiple imputation (Tabachnick & Fidell, 2013). However, self-compassion regression analyses using imputed data revealed the same pattern of findings as found in the regressions using completer data. As such, regression analyses using completer data for both mindfulness and self-compassion are reported.

No covariates were included in the baseline regression analyses as there were no significant correlations between WELQ and the DASS scales at pre-treatment and post-treatment, and weight change at post-treatment and follow-up, respectively (see Appendix C, Table C.1 and Table C.2). Regression analyses examining the change scores controlled for WELQ, as changes in WELQ across the treatment phase significantly correlated with weight change across the treatment ($r = -.368$) and follow-up phases ($r = -.213$; see Appendix C, Table C.3). Importantly, condition (CBT-Alone versus CBT-Support Person) was not used as a covariate in any of the analyses as it did not correlate significantly with weight change across the treatment and follow-up phases. A significance level of $p < .05$ was used in all analyses.

Results

Descriptive Characteristics

Table 1 presents the descriptive statistics for each of the variables at the baseline, post-treatment, and follow-up assessments. As there were no significant differences between the CBT-Support Person and CBT-Alone conditions on any of these measures at any time point, data for the total sample is reported.

In terms of changes in mindfulness and self-compassion from pre-treatment to post-treatment, *t*-tests revealed significant improvements on the KIMS Acting with Awareness ($t(110) = -2.852, p = .006$) and Accepting without Judgement ($t(110) = -2.244, p = .027$) subscales. There were no significant differences from pre-treatment to post-treatment on the KIMS Describing ($t(111) = -1.559, p = .122$) and Observing ($t(111) = .145, p = .885$) subscales. Regarding changes on the SCS-SF subscales, participants scored significantly higher on Self-Judgement ($t(112) = -2.518, p = .013$) and Isolation ($t(113) = -2.973, p = .004$) subscales from pre- to post-treatment, however as these are reversed scored, this means participants became less judgemental and had fewer feelings of isolation at post-treatment compared to pre-treatment. Participants also scored significantly higher on Common Humanity ($t(112) = -2.416, p = .017$) from pre- to post-treatment. There were no significant differences from pre-treatment to post-treatment on the Self-Kindness ($t(113) = -1.730, p = .086$), Mindfulness ($t(113) = -.691, p = .491$) and Over-Identification ($t(113) = -1.180, p = .240$) subscales.

In terms of changes in mindfulness from post-treatment to follow-up, there were no significant changes on the Observing ($t(84) = -.767, p = .446$), Describing ($t(84) = -.367, p = .714$), Acting with Awareness ($t(83) = -.000, p = 1.000$), or Accepting without Judgement ($t(84) = -.920, p = .360$) subscales. Regarding self-

compassion, there were no significant differences from post-treatment to follow-up Self-Kindness ($t(85) = -.731, p = .467$), Self-Judgement ($t(84) = -1.432, p = .159$), Common Humanity ($t(85) = -.914, p = .363$), Isolation ($t(85) = .755, p = .452$), Mindfulness ($t(85) = -.839, p = .404$), or Over-Identification ($t(84) = -1.289, p = .201$). Given the lack of significant changes in these constructs across the maintenance period, regression analyses examining the effect of changes in mindfulness and self-compassion across the follow-up phase on weight loss maintenance at follow-up assessment were not completed.

Table 1

Descriptive Statistics for Anthropometric and Psychological Variables by Time Point

Characteristic	Baseline (N = 201) Mean (SD)	Post-Treatment (N =118) Mean (SD)	Follow-Up (N = 95) Mean (SD)
Anthropometry			
Age (years)	47.03 (11.51)		
Weight (kg)	105.60 (20.66)	98.87 (20.17)	100.52 (20.32)
Psychological			
KIMS Accepting without Judgement	29.65 (6.04)	31.07 (6.34)	31.49 (6.72)
KIMS Acting with Awareness	29.53 (5.07)	30.70 (4.86)	30.47 (4.73)
KIMS Describing	27.93 (5.41)	28.84 (5.52)	28.82 (6.10)
KIMS Observing	37.11 (7.07)	37.24 (7.55)	36.99 (7.35)
SCS-SF Self-Kindness	5.63 (1.62)	6.15 (1.70)	6.17 (1.69)
SCS-SF Self-Judgement	5.61 (1.72)	6.04 (1.84)	6.20 (1.93)
SCS-SF Common Humanity	6.02 (1.75)	6.50 (1.76)	6.62 (1.92)
SCS-SF Isolation	5.64 (1.79)	6.03 (1.90)	5.94 (2.10)
SCS-SF Mindfulness	6.86 (1.59)	6.94 (1.55)	7.25 (1.50)
SCS-SF Over-Identification	5.71 (1.89)	6.07 (2.04)	36.30 (2.08)
WELQ Total	98.21 (27.56)	124.54 (29.28)	118.03 (27.65)
DASS Depression Scale	9.57 (8.10)	8.42 (8.93)	7.57 (8.42)
DASS Anxiety Scale	6.55 (6.52)	5.45 (6.22)	4.97 (5.03)
DASS Stress Scale	13.76 (8.90)	12.32 (8.43)	12.36 (9.45)

Note. KIMS = Kentucky Inventory of Mindfulness Skills, SCS-SF = Self-Compassion Scale Short-Form, WELQ = Weight Efficacy Lifestyle Questionnaire, DASS = Depression Anxiety Stress Scale.

Comparison Between Adults with Obesity and Comparison Samples on Mindfulness and Self-compassion

Table 2 presents the results from independent *t*-tests comparing differences between the baseline data for the obese sample from the present study to a comparison sample on levels of mindfulness and self-compassion. The comparison group for mindfulness was obtained from the second student sample in Baer and colleagues (2004). Of the 215 participants, approximately 60% were females and 85%

were Caucasian, and ages ranged between 18 to 22 years. The self-compassion comparison sample was acquired from sample three in Raes, Pommier, Neff, and Van Gucht (2011). The sample was comprised of 415 students (65.5% female; 53.5% Caucasian), ranging from 18 to 42 years of age ($M = 20.62$).

Table 2

Scores on the KIMS and SCS from the Obese and Comparison Groups

Variable	Comparison Group Mean (SD)	Obese Sample Mean (SD)	<i>t</i> -test	Sig.
KIMS	<i>n</i> = 215	<i>n</i> = 201		
Accepting without Judgement	29.61 (6.50)	29.65 (6.04)	0.065	0.948
Acting with Awareness	29.22 (5.37)	29.53 (5.07)	0.603	0.546
Describing	28.21 (5.48)	27.93 (5.41)	0.523	0.601
Observing	38.63 (7.80)	37.11 (7.07)	2.075	0.038
SCS-SF	<i>n</i> = 415	<i>n</i> = 200		
Self-Kindness	5.86 (1.46)	5.63 (1.62)	1.765	0.078
Self-Judgement	5.98 (1.71)	5.61 (1.72)	2.509	0.012
Common-Humanity	5.79 (1.60)	6.02 (1.75)	1.619	0.106
Isolation	6.14 (1.83)	5.64 (1.79)	3.196	0.001
Mindfulness	6.69 (1.55)	6.86 (1.59)	1.263	0.207
Over-Identification	6.39 (1.83)	5.71 (1.89)	4.270	<0.001
Total	36.00 (7.33)	35.49 (7.18)	0.814	0.146

Note. KIMS = Kentucky Inventory of Mindfulness Skills, SCS-SF = Self-Compassion Scale Short-Form; Self-Judgement, Isolation and Over-Identification are reverse scored.

No significant differences were apparent between the obese and comparison groups on the KIMS Describing, Acting with Awareness, and Accepting without Judgement subscales. However, the comparison group was significantly higher on the Observing subscale than the obese group ($t(414) = 2.075, p = .038$). A paired samples

t-test further revealed that individuals scored significantly higher ($t(197) = 11.500, p = .000$) on Observing scale items that were not body related (items 25, 29, 30, 33, 37, and 39), compared to items that were body related (items 1, 5, 9, 13, 17, and 21). On the SCS-SF subscales, there were no significant differences between the obese and comparison groups on the Self-Kindness, Common Humanity, and Mindfulness subscales. However, the obese group was significantly lower than the comparison group on the Self-Judgement ($t(613) = 2.509, p = .012$), Isolation ($t(613) = 3.196, p = .001$), and Over-Identification ($t(613) = 4.270, p < .001$) subscales. As these subscales are reverse scored, this means that the obese group were more self-judgemental, felt more isolated, and experienced greater identification with thoughts, feelings, and situations compared to the comparison group.

Mindfulness as a Predictor of Weight Change During the Treatment and Follow-up Phases

Baseline. A multiple regression analysis was used to determine whether scores on the KIMS predicted weight change across the treatment phase (Table 3). Results indicated that pre-treatment levels of mindfulness on the Accepting without Judgement subscale significantly predicted weight loss from pre- to post-treatment ($B = -.263, p = .047$), meaning that participants who were able to non-judgementally accept their thoughts and feelings were able to lose more weight than those who were critical towards the same. However, the pre-treatment scores on the remaining three KIMS subscales did not significantly predict weight change across the treatment phase. As shown in Table 4, there was a trend towards post-treatment scores on the Acting with Awareness subscale significantly predicting weight loss in the follow-up phase ($B = -.310, p = .053$), while the additional KIMS subscales were not predictive of weight change during this phase.

Table 3

Regression Model of KIMS Baseline Scores as a Predictor of Weight Change Across the Treatment Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Intercept	10.178 (6.920)		1.471	.144	-3.531; 23.888	
Accepting	-.263 (.131)	-.218	-2.009	.047	-.522; -.004	-.184
w/o Judge						
Acting w/	-.067 (.153)	-.045	-.436	.664	-.370; .237	-.040
Awareness						
Describing	-.024 (.148)	-.018	-.164	.870	-.317; .269	-.015
Observing	-.140 (.110)	-.139	-1.282	.202	-.358; .077	-.117

Note. KIMS = Kentucky Inventory of Mindfulness Skills

Table 4

Regression Model of KIMS Post-Treatment Scores as a Predictor of Weight Change During the Follow-up Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Intercept	8.709 (6.325)		1.377	.172	-3.875; 21.294	
Accepting	.189 (.119)	.191	1.595	.115	-.047; .425	.170
w/o Judge						
Acting w/	-.310 (.157)	-.221	-1.967	.053	-.623; .004	-.210
Awareness						
Describing	-.204 (.141)	-.184	-1.450	.151	-.485; .076	-.154
Observing	.083 (.112)	.093	.742	.460	-.139; .305	.079

Note. KIMS = Kentucky Inventory of Mindfulness Skills

Change scores. Table 5 presents regression analyses for changes in levels of mindfulness across the treatment phase as a predictor of weight loss across the same phase. As previously stated, changes in WELQ scores from pre- to post-treatment

were controlled for due to the significant correlation with weight change across the treatment phase ($r = -.368$; see Appendix C, Table C.3).

The results showed that increases on the Accepting without Judgement subscale across the treatment phase significantly predicted weight gain across the same time period ($B = .475, p = .001$), meaning that participants who became more accepting of their thoughts and feelings over the course of treatment were more vulnerable to weight gain at post-treatment. However, changes from pre- to post-treatment on the remaining three KIMS subscales were not significantly predictive of weight change across the treatment phase. Similarly, changes in levels of mindfulness on all KIMS subscales across the treatment phase were not significantly predictive of weight change across the follow-up phase (Table 6).

Table 5.

Regression Model of Changes in KIMS Scores Across the Treatment Phase as a Predictor of Weight Change Across the Treatment Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Model 1						
Intercept	-3.594 (.855)		-4.204	.000	-5.288; -1.899	
WELQ	-.086 (.021)	-.368	-4.100	.000	-.127; -.044	-.368
Model 2						
Intercept	-3.700 (.828)		-4.470	.000	-5.342; -2.058	
WELQ	-.099 (.020)	-.426	-4.876	.000	-.140; -.059	-.416
Accepting	.475 (.134)	.322	3.536	.001	.209; .741	.302
w/o Judge						
Acting w/	.088 (.171)	.048	.516	.607	-.251; .427	.044
Awareness						
Describing	-.097 (.167)	-.055	-.584	.561	-.428; .233	-.050
Observing	.116 (.121)	.086	.959	.340	-.123; .355	.082

Note. KIMS = Kentucky Inventory of Mindfulness Skills, WELQ = Weight Efficacy Lifestyle Questionnaire

Table 6

Regression Model of Changes in KIMS Scores Across the Treatment Phase as a Predictor of Weight Change Across the Follow-up Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Model 1						
Intercept	3.403 (.919)		3.701	.000	1.574; 5.231	
WELQ	-.044 (.022)	-.214	-1.997	.049	-.088; .000	-.214
Model 2						
Intercept	3.447 (.949)		3.662	.000	1.587; 5.367	
WELQ	-.046 (.023)	-.224	-2.039	.045	-.091; -.001	-.220
Accepting	.171 (.164)	.125	1.047	.298	-.154; .497	.113
w/o Judge						
Acting w/	-.163 (.197)	-.095	-.828	.410	-.555; .229	-.089
Awareness						
Describing	.142 (.198)	.085	.719	.474	-.252; .537	.078
Observing	.090 (.151)	.068	.593	.555	-.211; .390	.064

Note. KIMS = Kentucky Inventory of Mindfulness Skills, WELQ = Weight Efficacy Lifestyle Questionnaire

Self-Compassion as a Predictor of Weight Change During the Treatment and Follow-up Phases

Baseline. Multiple regression analysis revealed that there was a trend towards higher scores on the SCS-SF Mindfulness subscale significantly predicting weight gain across the treatment phase ($B = 2.133$, $p = .060$; Table 7), indicating that participants who were more mindful, such that they attempted to keep their emotions in balance in the face of painful or difficult situations, were more likely to have gained weight at post treatment. No other baseline SCS-SF subscales were predictive of weight change in the treatment phase. Results also showed that SCS-SF subscales

scores at post-treatment did not significantly predict weight change in the follow-up phase (Table 8).

Table 7

Regression Model of SCS-SF Baseline Scores as a Predictor of Weight Change Across the Treatment Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Intercept	-5.316 (3.634)		-1.463	.146	-12.517; 1.884	
Self-Kind	0.383 (1.152)	0.042	.333	.740	-1.899; 2.666	.031
Self-Judge	-1.270 (1.102)	-.141	-1.152	.252	-3.454; .914	-.106
Com Hum	-.713 (0.996)	-.086	-.716	.476	-2.686; 1.260	-.066
Isolation	-.110 (0.998)	-.013	-.110	.913	-2.087; 1.868	-.010
Mindfulness	2.133 (1.123)	.230	1.899	.060	-.093; 4.359	.175
Over-Identif	-.906 (1.124)	-.112	-.806	.422	-3.133; 1.321	-.075

Note. SCS-SF = Self-Compassion Scale Short-Form

Table 8

Regression model of SCS-SF Post-Treatment Scores as a Predictor of Weight Change Across the Follow-up Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Intercept	5.996 (3.775)		1.597	.114	-1.475; 13.466	
Self-Kind	0.292 (1.034)	.040	.282	.778	-1.766; 2.350	.030
Self-Judge	1.594 (1.057)	.236	1.507	.136	-.510; 3.698	.162
Com Hum	-.226 (0.943)	-.038	-.283	.778	-2.142; 1.609	-.030
Isolation	-1.608 (0.891)	-.235	-1.806	.075	-3.381; .164	-.194
Mindfulness	-.617 (1.042)	-.075	1.593	.555	-2.690; 1.456	-.064
Over-Identif	-.460 (.918)	-.075	1.501	.617	-2.286; 1.366	-.054

Note. SCS-SF = Self-Compassion Scale Short-Form

Change scores. Multiple regression analysis revealed that changes on the SCS-SF subscales across the treatment period did not significantly predict weight change in either the treatment (Table 9) or follow-up phases (Table 10).

Table 9

Regression Model of Changes in SCS-SF Scores Across the Treatment Phase as a Predictor of Weight Change Across the Treatment Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Model 1						
Intercept	-3.662 (0.861)		-4.251	.000	-5.370; -1.954	
WELQ	-.086 (.021)	-.366	-4.071	.000	-.128; -.044	-.366
Model 2						
Intercept	-3.658 (.885)		-4.131	.000	-5.414; -1.901	
WELQ	-.100 (.022)	-.427	-4.542	.000	-.144; -.056	-.403
Self-Kind	-.895 (0.873)	-.109	-1.025	.308	-2.627; .838	-.091
Self-Judge	1.467 (.854)	.184	1.719	.089	-.226; 3.161	.153
Com Hum	-.707 (.803)	-.087	-.881	.381	-2.301; .866	-.078
Isolation	.800 (.756)	.106	1.059	.292	-.699; 2.299	.094
Mindfulness	-.100 (.803)	-.012	-.125	.901	-1.693; 1.493	-.011
Over-Identif	.699 (.865)	.086	.809	.421	-1.016; 2.415	.072

Note. SCS-SF = Self-Compassion Scale Short-Form, WELQ = Weight Efficacy Lifestyle Questionnaire

Table 10

Regression Model of Changes in SCS-SF Scores Across the Treatment Phase as a Predictor of Weight Change Across the Follow-up Phase

Variable	B (SE)	Beta	<i>t</i>	Sig.	95% CI	Semi-partial R^2
Model 1						
Intercept	3.568 (.921)		3.875	.000	1.736; 5.399	
WELQ	-.045 (.022)	-.220	-2.054	.043	-.089; -.001	-.220
Model 2						
Intercept	3.876 (.975)		3.974	.000	1.934; 5.819	
WELQ	-.049 (.024)	-.239	-2.043	.045	-.097; -.001	-.221
Self-Kind	.562 (.973)	.074	.578	.565	-1.375; 2.499	.063
Self-Judge	.816 (.925)	.112	.883	.380	-1.025; 2.658	.096
Com Hum	-.646 (.875)	-.091	-.738	.463	-2.389; 1.097	-.080
Isolation	-.696 (.856)	-.095	-.814	.418	-2.400; 1.008	-.088
Mindfulness	-1.451 (.954)	-.177	-1.522	.132	-3.350; .448	-.165
Over-Identif	-.232 (.958)	-.030	-.242	.810	-2.139; 1.676	-.026

Note. SCS-SF = Self-Compassion Scale Short-Form, WELQ = Weight Efficacy Lifestyle Questionnaire

Discussion

The present study aimed to contribute to the growing body of research on the potential utility of mindfulness and self-compassion in the treatment of participants who are overweight or obese. More specifically, the study sought to (1) evaluate whether levels of mindfulness and self-compassion at the beginning of a behavioural weight loss program predicted weight loss at the end of treatment, and whether levels of mindfulness and self-compassion at the end of treatment predicted weight loss at the follow-up assessment; and (2) evaluate whether improvements in mindfulness and self-compassion across the course of treatment predicted weight loss at the end of treatment and at follow-up.

Contrary to the first hypothesis, the obese group did not differ significantly from the normative samples on baseline levels of mindfulness, with the exception of the KIMS Observing subscale. Specifically, the obese group appeared to have significantly lower observing tendencies compared to the comparison group. This difference may be due to the fact that half of the items on the Observing subscale make reference to observations of the body (e.g., ‘when I’m walking, I deliberately notice the sensations of my body moving’ and ‘when I take a bath, I stay alert to the sensations of water on my body’). In fact, obese participants had significantly higher observing tendencies for items that were not body related (e.g., ‘I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing’), compared to those that were body related. Considering that body dissatisfaction is experienced by many individuals with obesity, and is elevated compared to non-obese controls (Weinberger, Kersting, Riedel-Heller, & Luck-Sikorski, 2016), these results may reflect avoidance of observing body-related sensations in order to prevent triggering feelings of body dissatisfaction. In this case, avoidance may even be adaptive if it reduces vulnerability to engagement in overeating in response to negative body-related thoughts and feelings.

As the Observing subscale may confound observing and body dissatisfaction in this manner, it is difficult to determine if individuals with obesity have general problems with the observing component of mindfulness, or if this is due to the body-related nature of the questions. This finding suggests that the KIMS measure of mindfulness should be used cautiously within the obesity context, and that perhaps another questionnaire should be utilised to more accurately measure the observing component of mindfulness in this population. The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is the

only alternative mindfulness self-report questionnaire that assesses the observing component of mindfulness independent of its other components. However, it too has half of the Observing scale items referencing bodily sensations, meaning that if the FFMQ were to be used in the context of obesity, there may be the same issues. It is important that measures focus on sensations other than those directly related to the body, for this may result in a more accurate measurement of observing tendencies among individuals vulnerable to experiencing body dissatisfaction, including those with obesity. Despite the fact that observing is recognised as a core component of mindfulness, the majority of mindfulness self-report questionnaires neglect to independently measure this component and thus further research is needed to develop a psychometrically sound mindfulness measure to be used among individuals with obesity.

In partial support of the first hypothesis, it was also found that the obese group demonstrated a less self-compassionate perspective compared to those in the comparison group, evidenced by their significantly higher scores on SCS-SF Self-Judgement, Isolation, and Over-Identification subscales. The suggestion that the obese group are more susceptible to being consumed by the negative components of their experience and being judgemental of themselves parallels research demonstrating that individuals with obesity have lower self-esteem than non-obese individuals (Friedman et al., 2005). Similarly, the significantly higher scores on the Isolation subscale are in line with findings that individuals with obesity report greater perceptions of social isolation compared to non-obese individuals (Anderson, Rieger, & Caterson, 2006). When beliefs regarding social isolation are activated, maladaptive coping behaviours may be employed to compensate for the thoughts and feelings associated with loneliness and disconnection from others, resulting in weight gain.

Not only does isolation create barriers to weight loss, it is also associated with self-stigmatisation and inversely associated with quality of life (Hilbert et al., 2015).

While the significantly higher scores of the obese group compared to the comparison group on the Self-Judgement, Isolation, and Over-Identification subscales are consistent with the hypothesis and previous research, any conclusions regarding differences between obese and non-obese groups based on the current data must be considered tentative given that the obese and comparison groups were not matched on key variables that may affect levels of mindfulness and self-compassion. Specifically, comparison groups in the study were not matched for age, with the obese group being of older age ($M = 47.03$ years) than the comparison group for the KIMS ($M =$ approx. 20 years) and the SCS-SF ($M = 20.6$ years). While the correlation between self-compassion and age is unknown, recent research suggests that mindfulness abilities improve with age (Hohaus & Spark, 2013). Thus, it would be useful to investigate a comparable age sample to determine if the lack of differences between the groups on the majority of the KIMS subscales was attributed to the obese group being more advanced in their general mindfulness abilities due to age, compared to the young adult comparison group. When compared to an equal age group, it is possible that individuals with obesity would have significantly lower mindfulness and self-compassion abilities compared to their peers without obesity.

The second hypothesis, that pre- and post-treatment mindfulness and self-compassion scores would significantly predict greater weight loss at post-treatment and weight loss maintenance at follow-up, respectively, received some support. While the majority of the mindfulness subscales at pre-treatment were not predictive of greater weight loss across the treatment phase, higher scores on the KIMS Accepting without Judgement subscale significantly predicted weight loss. This indicates that

having a non-judgemental attitude towards thoughts and feelings at the beginning of the program facilitated weight loss, while individuals who adopted a judgemental stance had less positive weight outcomes. A potential explanation of this finding relates to the emotion regulation strategies that might be employed by individuals with obesity in the face of aversive experiences. Emotion regulation refers to the process by which individuals influence the experience and expression of their emotions, with the primary aim being to modulate (as opposed to eliminate) emotional responses through the use of appropriate coping strategies (Gross, 1998). According to emotion regulation models such as the aforementioned escape theory (Heatherton & Baumeister, 1991), binge eating is a mechanism through which individuals manage negative emotional experiences and negative self-awareness. As per this theory, if individuals judge their thoughts and feelings negatively, they are vulnerable to engaging in overeating as a means of diverting attention away from ego-threatening information, with poor access to emotion regulation strategies shown to be associated with overeating (Gianini, White, & Masheb, 2013). As such, those with greater ability to non-judgmentally accept their thoughts and feelings at pre-treatment may be more able to lose weight during the course of treatment.

Emotion regulation models may also account for the finding that participants who scored higher on the SCS-SF Mindfulness subscale at baseline showed a trend towards significant weight gain across the treatment phase. The items on the SCS-SF Mindfulness subscale refer to keeping thoughts and feelings in ‘balance’ (e.g., ‘when something painful happens I try to take a balanced view of the situation’ and ‘when something upsets me I try to keep my emotions in balance’). The concept of holding a balanced perspective could be interpreted as a need to alter their present emotional state (i.e., regulate their emotions) to achieve a sense of balance. This is in contrast to

viewing a state of balance as remaining aware of and accepting thoughts and feelings. Therefore, it is possible that individuals scoring highly on the SCS-SF Mindfulness subscale gained weight across treatment as they achieved a perceived level of balance through the use of maladaptive emotion regulation strategies (e.g., overeating). Thus, the SCS-SF Mindfulness subscale items are potentially not appropriate for measuring levels of mindfulness among individuals with obesity.

Regarding post-treatment mindfulness levels predicting greater weight loss maintenance across the follow-up phase, only the KIMS Acting with Awareness subscale showed a trend towards significantly predicting weight loss maintenance. This result suggests that individuals were able to better manage their weight during the follow-up phase if they had the ability to have greater awareness of their actions, even when not aided by the therapist or other treatment group members. This finding may help to explain Forman and colleagues' (2009) finding that improvements in mindfulness across the treatment phase resulted in greater weight loss at the follow-up assessment. As a multidimensional construct, it may specifically be the awareness component of mindfulness that fosters weight loss following a treatment program, as opposed to mindfulness in general. According to Self-regulation Theory (Schwartz, 1975), the capacity to be aware of and observe internal states is critical for regulation of internal systems. In practicing the mindfulness skill of acting with awareness, individuals are able to increase their awareness of thoughts and emotional states that undermine their healthy eating and physical activity goals, as well as hunger and satiety cues, which can help to facilitate self-regulation. Not only does this finding highlight that acting with awareness can be advantageous for long-term treatment outcomes, it also suggests that awareness training in weight loss interventions may aid weight loss outcomes.

The final hypothesis, that improvements in mindfulness and self-compassion across the treatment phase will predict greater weight loss at program completion and weight loss maintenance at follow-up, received minimal support. This was despite the fact that participants improved significantly on half of the mindfulness (Accepting without Judgement and Acting with Awareness) and self-compassion (Self-Judgement, Isolation, and Common Humanity) subscales from pre-treatment to post-treatment. This suggests that improvements in mindfulness and self-compassion do not necessarily contribute to weight loss among individuals with obesity. In fact, in stark contrast to the baseline results, when measuring *changes* in mindfulness across the treatment phase, those who became more accepting of their thoughts and feelings (i.e., increased on the Accepting without Judgement subscale during treatment) unexpectedly experienced less weight loss across the treatment phase. As participants were engaged in a CBT intervention whereby challenging thoughts that sabotage healthy eating and physical activity goals was a central skill, those who continued to accept their thoughts may not have been fully utilising this skill. As such, while higher scores on the Accepting without Judgement subscale appeared to be a protective factor at pre-treatment, being less able to learn to challenge thoughts during the intervention may have impeded weight loss.

The inconsistent relationship between Accepting without Judgement and weight loss found in the present study may be at least partly due to the fact that the Accepting without Judgement scale confounds the two distinct constructs of thoughts and feelings (e.g., ‘I make judgements about whether my thoughts are good or bad’ and ‘I criticise myself for having irrational or inappropriate emotions’). While the basis of mindfulness is to non-judgementally accept thoughts and feelings, the premise of a cognitive behavioural intervention is to *challenge* thoughts that

undermine healthy eating, while becoming more *accepting* of emotional experiences in order to reduce emotional eating. As such, amalgamating thoughts and feelings in a single scale prevents the detection of possible different roles of accepting thoughts versus feelings for weight loss.

In addition to the limitations already noted, the current study was limited by a substantial attrition rate, consistent with that of other weight loss treatment programs (e.g., Dalle Grave et al. 2005; Forman et al., 2009; Teixeira et al., 2004b). Of all participants, 41.3% ($n = 83$) did not participate in the post-treatment assessment, and a further 19.5% ($n = 23$) did not complete the follow-up assessment. As it cannot be assumed that discontinuation of treatment occurred at random, and it is unclear which variables accounted for treatment discontinuation, the generalisability of the findings are potentially limited. A lower attrition rate would enable greater accuracy in determining whether mindfulness and self-compassion predict weight loss among individuals who are obese.

The findings of the current study demonstrate limited support for self-compassion and mindfulness being predictive of weight loss either during treatment or in the immediate period following cessation of treatment in individuals who are obese. Two components of mindfulness – accepting without judgement and acting with awareness – were predictive of weight loss across the treatment and follow-up phases, though the Accepting without Judgement subscale showed a reverse association across these two phases. This limited support for mindfulness and self-compassion in a weight loss context raises the issue of incorporating these constructs into treatment approaches without adequate empirical research supporting their efficacy (regardless of empirical support for the constructs within other psychological disorders or physical health problems). If increased levels of mindfulness do in fact

result in weight gain among certain individuals, further research should be conducted to ascertain how individual characteristics may influence the efficacy of mindfulness and self-compassion prior to including such constructs in weight loss approaches. Moreover, the development of psychometrically sound mindfulness and self-compassion measures for individuals with obesity is needed before research can effectively measure whether these constructs enhance treatment outcomes. Until this has occurred, it cannot be confidently stated whether or not mindfulness and self-compassion enhance the outcomes of behavioural weight loss programs for obesity.

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Appendix A: Author Guidelines for *Cognitive and Behavioural Practice*

Introduction

Cognitive and Behavioral Practice is a quarterly international journal with the primary mission of clinical dissemination: to bridge the gap between published clinical research and the actual clinical practice of cognitive and behavioral therapies. *Cognitive and Behavioral Practice* publishes clinically rich accounts of innovative assessment and therapeutic procedures that are clearly grounded in evidence-based practice. The primary focus is on application and implementation of procedures. Accordingly, topics are selected to address current challenges facing practitioners, both in terms of technique, process, and the content of treatment. To meet this goal, articles may include rich descriptions of clinical interventions, examples of client-therapist dialog, embedded video clips readers can view on line, and/or significant case descriptions. This journal is for the practicing mental health clinician, instructors, and researchers with an interest in the clinical dissemination of their findings. Continuing education examinations are included in each issue.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

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Graphical Abstracts / Highlights files (where applicable)

Supplemental files (where applicable)

Further considerations

- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- Relevant declarations of interest have been made
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

Ethics in publishing

Policy and ethics

All manuscripts should be prepared in conformity with the format described in the

Publication Manual of the American Psychological Association, Sixth Edition (2009), and it is the responsibility of the author that manuscripts adhere to the format and other requirements of Cognitive and Behavioral Practice. Manuscript submission requirements for Cognitive and Behavioral Practice are in accordance with the Uniform Requirements for Manuscripts Submitted to Medical Journals (<http://www.icmje.org>) which describe ethical principles in the conduct and reporting of research and provide recommendations relating to editing and writing. However, in the few cases when elements of format and style differ between the Publication Manual of the American Psychological Association and the Uniform Requirements for Manuscripts Submitted to Medical Journals, manuscripts should follow the guidelines of the Publication Manual of the American Psychological Association. For example, reference style and format as well as formatting of tables and legends should follow the Publication Manual of the American Psychological Association as opposed to the Uniform Requirements for Manuscripts Submitted to Medical Journals.

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PREPARATION

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If you are submitting original research, the structure of your paper should typically reflect the stages of the research process:

Introduction
Method

Results
Discussion

However, as contributions to this journal take various forms (including empirical research, review articles, methodological papers, and case studies), authors are urged to organize their manuscripts in ways that make sense to their particular article type.

A detailed description of all possible sections is shown below.

Introduction: State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Methods: Provide sufficient detail to allow the work to be reproduced. Methods already published should be indicated by a reference: only relevant modifications should be described.

Results: Results should be clear and concise.

Discussion: This should explore the significance of the results of the work, not repeat them. Avoid extensive citations and discussion of published literature.

Conclusions: The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Glossary: Please supply, as a separate list, the definitions of field-specific terms used in your article.

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Appendix B: Measures

Kentucky Inventory of Mindfulness Skills

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

- | 1 | 2 | 3 | 4 | 5 |
|---------------------------------|----------------|-------------------|---------------|----------------|
| Never or
very rarely
true | Rarely
true | Sometimes
true | Often
true | Always
true |
-
- _____ 1. I notice changes in my body, such as whether my breathing slows down or speeds up.
 - _____ 2. I'm good at finding the words to describe my feelings.
 - _____ 3. When I do things, my mind wanders off and I'm easily distracted.
 - _____ 4. I criticise myself for having irrational or inappropriate emotions.
 - _____ 5. I pay attention to whether my muscles are tense or relaxed.
 - _____ 6. I can easily put my beliefs, opinions, and expectations into words.
 - _____ 7. When I'm doing something, I'm only focused on what I'm doing, nothing else.
 - _____ 8. I tend to evaluate whether my perceptions are right or wrong.
 - _____ 9. When I'm walking, I deliberately notice the sensations of my body moving.
 - _____ 10. I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.
 - _____ 11. I drive on "automatic pilot" without paying attention to what I'm doing.
 - _____ 12. I tell myself that I shouldn't be feeling the way I'm feeling.
 - _____ 13. When I take a shower or bath, I stay alert to the sensations of water on my body.
 - _____ 14. It's hard for me to find the words to describe what I'm thinking.
 - _____ 15. When I'm reading, I focus all my attention on what I'm reading.
 - _____ 16. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
 - _____ 17. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.

- _____ 18. I have trouble thinking of the right words to express how I feel about things.
- _____ 19. When I do things, I get totally wrapped up in them and don't think about anything else.
- _____ 20. I make judgments about whether my thoughts are good or bad.
- _____ 21. I pay attention to sensations, such as the wind in my hair or sun on my face.
- _____ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.
- _____ 23. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
- _____ 24. I tend to make judgements about how worthwhile or worthless my experiences are.
- _____ 25. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- _____ 26. Even when I'm feeling terribly upset, I can find a way to put it into words.
- _____ 27. When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things.
- _____ 28. I tell myself that I shouldn't be thinking the way I'm thinking.
- _____ 29. I notice the smells and aromas of things.
- _____ 30. I intentionally stay aware of my feelings.
- _____ 31. I tend to do several things at once rather than focusing on one thing at a time.
- _____ 32. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
- _____ 33. I notice visual elements in art or nature, such as colours, shapes, textures, or patterns of light and shadow.
- _____ 34. My natural tendency is to put my experiences into words.
- _____ 35. When I'm working on something, part of my mind is occupied with other topics, such as what I'll be doing later, or things I'd rather be doing.
- _____ 36. I disapprove of myself when I have irrational ideas.
- _____ 37. I pay attention to how my emotions affect my thoughts and behavior.
- _____ 38. I get completely absorbed in what I'm doing, so that all my attention is focused on it.
- _____ 39. I notice when my moods begin to change.

Self-Compassion Scale

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost never				Almost always
1	2	3	4	5

- _____ 1. When I fail at something important to me I become consumed by feelings of inadequacy.
- _____ 2. I try to be understanding and patient towards those aspects of my personality I don't like.
- _____ 3. When something painful happens I try to take a balanced view of the situation.
- _____ 4. When I'm feeling down, I tend to feel like most other people are probably happier than I am.
- _____ 5. I try to see my failings as part of the human condition.
- _____ 6. When I'm going through a very hard time, I give myself the caring and tenderness I need.
- _____ 7. When something upsets me I try to keep my emotions in balance.
- _____ 8. When I fail at something that's important to me, I tend to feel alone in my failure.
- _____ 9. When I'm feeling down I tend to obsess and fixate on everything that's wrong.
- _____ 10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
- _____ 11. I'm disapproving and judgmental about my own flaws and inadequacies.
- _____ 12. I'm intolerant and impatient towards those aspects of my personality I don't like.

Weight Efficacy Lifestyle Questionnaire

This form describes some typical eating situations. Everyone has situations which make it very hard for them to keep their weight down. The following are a number of situations relating to eating patterns and attitudes. This form will help you to identify the eating situations which you find the hardest to manage.

Please read each situation listed below and decide how confident (certain) you are that you will be able to resist eating in each of these difficult situations. In other words, pretend that you are in the eating situation right now. On a scale from 0 (not confident) to 9 (very confident), choose ONE number that reflects how confident you feel now about being able to *successfully resist* the desire to eat. Write this number down next to each item.

0	1	2	3	4	5	6	7	8	9
Not confident at all that I can resist the desire to eat								Very confident that I can resist the desire to eat	

I AM CONFIDENT THAT:

1. I can resist eating when I am anxious (nervous). _____
2. I can control my eating on weekends. _____
3. I can resist eating when I have to say "no" to others. _____
4. I can resist eating when I feel physically run down. _____
5. I can resist eating when I am watching TV. _____
6. I can resist eating when I am depressed (down). _____
7. I can resist eating when there are many different kinds
of food available. _____
8. I can resist eating when I feel it is impossible to refuse a
second helping. _____
9. I can resist eating when I have a headache. _____
10. I can resist eating when I am reading. _____
11. I can resist eating when I am angry (or irritable). _____
12. I can resist eating when I am at a party. _____
13. I can resist eating even when others are pressuring me _____

to eat.

14. I can resist eating when I am in pain. _____
15. I can resist eating just before going to bed. _____
16. I can resist eating when I have experienced failure. _____
17. I can resist eating even when high-calorie foods are
available. _____
18. I can resist eating even when I think others will be upset
if I don't eat. _____
19. I can resist eating when I feel uncomfortable. _____
20. I can resist eating when I am happy. _____

Rosenberg Self-Esteem Scale

Please indicate how much you agree with the following statements ranging from "strongly agree" (1) to "strongly disagree" (4). Circle the appropriate number beside each statement.

- 1 = Strongly Agree
 2 = Agree
 3 = Disagree
 4 = Strongly Disagree

1. On the whole, I am satisfied with myself.	1	2	3	4
2. At times, I think I am no good at all.	1	2	3	4
3. I feel that I have a number of good qualities.	1	2	3	4
4. I am able to do things as well as most other people.	1	2	3	4
5. I feel I do not have much to be proud of.	1	2	3	4
6. I certainly feel useless at times.	1	2	3	4
7. I feel that I'm a person of worth, at least on an equal plane with others.	1	2	3	4
8. I wish I could have more respect for myself.	1	2	3	4
9. All in all, I am inclined to feel that I am a failure.	1	2	3	4
10. I take a positive attitude to myself.	1	2	3	4

Depression Anxiety Stress Scale

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past month*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree, or a good part of time

3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3

14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3